Calculus 7th Edition Stewart Test Bank

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Chapter 03_Form A

NUMERIC RESPONSE

1. Find f' in terms of g'.

$$f(x) = x^2 g(x)$$

ANS: $f'(x) = 2xg(x) + x^2g'(x)$

PTS: 1 DIF: Easy MSC: Numerical Response NOT: Section 3.1

2. Find the points on the curve $y = 2x^3 + 3x^2 - 12x + 1$ where the tangent is horizontal.

ANS: (1,-6), (-2, 21)

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.1

3. Find the equation of the tangent to the curve at the given point.

$$y = \sqrt{1 + 4\sin x}, \quad (0, 1)$$

ANS: y = 2x + 1

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.1

4. Differentiate.

 $g(x) = x^7 \cos x$

ANS: $g'(x) = 7x^6 \cos(x) - x^7 \sin(x)$ PTS: 1 DIF: Medium NOT: Section 3.3

MSC: Numerical Response

5. Differentiate the function.

$$G(u) = \ln \sqrt{\frac{3u+6}{3u-6}}$$

ANS:
$$G'(u) = \frac{-2}{u^2 - 4}$$

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.6

- 6. The height (in meters) of a projectile shot vertically upward from a point 2 m above ground level with an initial velocity of 24.5 m/s is $2h = 2 + 24.5t 4.9t^2$ after *t* seconds.
 - a) When does the projectile reach its maximum height?b) What is the maximum height?

ANS: 2.5 s

32.625 m

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.7

7. Use implicit differentiation to find an equation of the tangent line to the curve at the given point.

 $y \sin 2x = x \cos 2y$, $(\pi/2, \pi/4)$

ANS: $y = \frac{1}{2}x$

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.5

8. Calculate y'.

$$y = \sqrt{x} \cos \sqrt{x}$$

ANS:
$$y' = -\frac{1}{2} \left(\frac{\sqrt{x} \sin \sqrt{x} - \cos \sqrt{x}}{\sqrt{x}} \right)$$

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.3 9. A spherical balloon is being inflated. Find the rate of increase of the surface area $S = 4\pi r^2$ with respect to the radius *r* when r = 1 ft.

ANS: 8π

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.7

10. Find the derivative of the function.

$$y = 2\cos^{-1}\left(\sin^{-1}t\right)$$

ANS:
$$y' = -\frac{2}{\sqrt{\left(1 - t^2\right)\left(1 - \left(\sin^{-1}(t)\right)^2\right)}}$$

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.3

11. Find an equation of the tangent line to the curve.

$$y = \frac{\sqrt{x}}{x+6}$$
 at (4, 0.2)

ANS:
$$y = \frac{1}{200} (x - 4) + 0.2$$

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.1

12. The top of a ladder slides down a vertical wall at a rate of 0.15 m/s. At the moment when the bottom of the ladder is 3 m from the wall, it slides away from the wall at a rate of 0.2 m/s. How long is the ladder?

_____ m ANS: 5 m PTS: 1 DIF: Medium NOT: Section 3.9

MSC: Numerical Response

13. Find the limit if $g(x) = x^5$.

$$\lim_{x \to 2} \frac{g(x) - g(2)}{x - 2}$$

ANS: 80

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.3

14. A company makes computer chips from square wafers of silicon. It wants to keep the side length of a wafer very close to 16 mm. The area is A(x). Find A'(16).

ANS: 32

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.7

15. Calculate y'.

$$xy^4 + x^2y = x + 3y$$

ANS:
$$y' = \frac{1 - y^4 - 2xy}{4xy^3 + x^2 - 3}$$

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.5

16. Find the first and the second derivatives of the function.

$$y = \frac{x}{3-x}$$

ANS: $3(3-x)^{-2}$, $6(3-x)^{-3}$

PTS: 1 DIF: Medium MSC: Numerical Response NOT: Section 3.1

17. Find the given derivative by finding the first few derivatives and observing the pattern that occurs.

$$\frac{d^{75}}{dx^{75}}(\sin x)$$

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ANS:
$$-\cos x$$

PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 3.1
18. If $y = 2x^3 + 5x$ and $\frac{dy}{dx} = 3$, find $\frac{dy}{dt}$ when $x = 5$.
ANS: 465
PTS: 1 DIF: Medium MSC: Numerical Response
NOT: Section 3.1
19. The volume of a cube is increasing at a rate of 10 cm³/min. How fast is the surface area increasing
when the length of an edge is 30 cm.

ANS: $\frac{4}{3}$ cm² / min

PTS: 1 DIF: Medium NOT: Section 3.9

MSC: Numerical Response

20. If
$$f(x) = \frac{x}{\ln x}$$
, find $f'(e^3)$.

ANS: 2/9

PTS: 1 DIF: Medium NOT: Section 3.6

MSC: Numerical Response