

Record your answers to the multiple choice problems by placing an \times through one letter for each problem on this page. There are 12 multiple choice questions worth 7 points each. You start with 16 points.

You may not use a calculator.

1.

a

b

c

d

•

7.

a

•

c

d

e

2.

a

b

c

•

e

8.

a

b

•

d

e

3.

a

•

c

d

e

9.

a

b

c

d

•

4.

a

•

c

d

e

10.

a

b

c

d

•

5.

a

b

c

•

e

11.

a

b

c

d

•

6.

•

b

c

d

e

12.

a

b

c

•

e

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1. ☐a ☐b ☐c ☐d ☐e

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7. ☐a ☐b ☐c ☐d ☐e

8. ☐a ☐b ☐c ☐d ☐e

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10. ☐a ☐b ☐c ☐d ☐e

11. ☐a ☐b ☐c ☐d ☐e

12. ☐a ☐b ☐c ☐d ☐e

1. If $f(x) = x^3 + \sin(2x) + \cos(x)$, find $(f^{-1})'(1)$.

(a) $\frac{1}{6}$

(b) $\frac{1}{3 + 2 \cos(1) + \sin(1)}$

(c) $\frac{1}{3}$

(d) $3 + 2 \cos(1) + \sin(1)$

(e) $\frac{1}{2}$

2. Use integration by parts to evaluate $\int x \tan^{-1}(x) dx$.

(a) $\frac{1}{2}x^2 + \tan^{-1}(x) + C$

(b) $\frac{x}{1+x^2} - \tan^{-1}(x) + C$

(c) $\frac{1}{2}x^2 \tan^{-1}(x) - \tan^{-1}(x) + C$

(d) $\frac{1}{2}(x^2 + 1) \tan^{-1}(x) - \frac{x}{2} + C$

(e) $\frac{1}{2}x^2 \tan^{-1}(x) + \frac{x}{2} + C$

3. Compute $\lim_{x \rightarrow \infty} \left(1 + \frac{a}{x}\right)^x$ where a is a constant.

(a) a/e

(b) e^a

(c) e^{-a}

(d) 1

(e) 0

4. Find the slope of the tangent line to $y = \cosh^{-1}(x)$ at $x = 2$.

(a) $\frac{e^2 - e^{-2}}{2}$

(b) $\frac{1}{\sqrt{3}}$

(c) $\frac{1}{\sqrt{5}}$

(d) $\frac{e^2 + e^{-2}}{2}$

(e) $\frac{1}{2}$

5. Find the limit $\lim_{x \rightarrow 0^+} \tan^{-1}(\ln x)$.

- (a) π (b) $-\pi$ (c) 0 (d) $-\pi/2$ (e) $\pi/2$

6. Evaluate the integral $\int_1^2 \frac{dx}{x^2 \sqrt{x^2 + 1}}$.

- (a) $\sqrt{2} - \sqrt{5}/2$ (b) $1/\sqrt{2} - 1/\sqrt{5}$ (c) $\sqrt{5}/2 - 1$
(d) $1 - 1/\sqrt{2}$ (e) $\sqrt{5} - \sqrt{2}$

7. Evaluate $\int_0^{\ln(3)} \frac{e^x}{e^x + 1} dx$.

- (a) $\frac{4}{\ln(2)}$ (b) $\ln(2)$ (c) $\frac{1}{\ln(4)}$ (d) $\frac{1}{\ln(3/2)}$ (e) $\ln(3)$

8. Integrate $\int_0^\pi \sin^3(x) dx$.

- (a) $1/4$ (b) $1/3$ (c) $4/3$ (d) 0 (e) 1

9. Calculate $\frac{d}{dx}\sqrt{x}^{\sqrt{x}}\Big|_{x=4}$.

(a) $4(\ln(2) + 1)$

(b) $(\ln(2) + 2)/4$

(c) 2

(d) 1

(e) $\ln(2) + 1$

10. A beaker of water at $100^\circ C$ cools to $40^\circ C$ in 30 minutes in a room with temperature $20^\circ C$. Determine the temperature of the water after t minutes.

(a) $20 + 100e^{t/30}$

(b) $20 + 80e^{-30t \ln(.4)}$

(c) $100e^{t \ln(.4)/30}$

(d) $100e^{-30t \ln(.25)}$

(e) $20 + 80e^{t \ln(.25)/30}$

11. Find the largest interval around $x = 0$ where the function $f(x) = x + 2 \sin(x)$ is one-to-one.

(a) $\left[-\frac{5\pi}{6}, \frac{5\pi}{6}\right]$

(b) $\left[-\frac{\pi}{3}, \frac{\pi}{3}\right]$

(c) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

(d) $\left[-\frac{\pi}{6}, \frac{\pi}{6}\right]$

(e) $\left[-\frac{2\pi}{3}, \frac{2\pi}{3}\right]$

12. If $f(x) = \ln \sqrt{\frac{9-x}{5+x}}$, find $f'(2)$.

(a) $1/4$

(b) 1

(c) $\sqrt{5}/3$

(d) $-1/7$

(e) $-\sqrt{5}/6$