

Problems for Lecture 4

1. Compute $f'(x)$ and $f''(x)$.

a) $f(x) = x^4 - x\sqrt{x} + 3x$, $x > 0$

b) $f(x) = x\sqrt{x^2+1}$

c) $f(x) = \frac{x+1}{x^2-3x+2}$, $x \neq 1, 2$

d) $f(x) = xe^x - x^2e^{-x} + e^{2x-1}$

e) $f(x) = \ln(x) - \ln(x-1)$, $x > 1$

f) $f(x) = \ln(x^3 - x^2)$, $x > 1$

2. Is f convex, concave, or neither?

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

b) $f(x) = x^a$ ($a > 0$)

c) $f(x) = e^x$

d) $f(x) = \ln(x)$, $x > 0$

e) $f(x) = \ln(x^3 - x^2)$, $x > 1$