

## Problem Set 2

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

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

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

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

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

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

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

2. Determine whether  $f$  is convex or concave:

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